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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
PAPPAS, PETER	
ART UNIT	PAPER NUMBER
2671	

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/058,905	KASE ET AL.	
	Examiner	Art Unit	
	Peter-Anthony Pappas	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _14 June 2004_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-19_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-19_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _14 June 2004_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ______.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ______ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The specification is objected to as a term used in the claims may be given a special meaning in the description, however, no term may be given a meaning repugnant to the usual meaning of the term. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Applicant discloses on page 5, ¶ 10, "...(a) internal cells 13a located in the interior of the object or in the region outside of the object, and (b) boundary cells 13b including boundary surfaces." Defining internal cells as being located in the region outside of the object is considered repugnant to the usual meaning of the term as known to one skilled in the art.

Claim Objections

2. Claims 13-14 are objected to as they appear inconsistent when viewed in light of the specification. Said claim appear to only refer to an internal cell located in the interior of the object, while the specification discloses on page 5, ¶ 10, "...(a) internal cells 13a located in the interior of the object or in the region outside of the object..."

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, 7-10, 13-15 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kela (Hierarchical octree approximations for boundary

representation-based geometric models) in view of Shu et al. (U.S. Patent No. 6, 075, 538).

5. In regards to claim 1 Kela teaches a solid modeling system (page 1), utilizing hierarchical octree approximation for boundary representation-based geometric models (modified Octree division), wherein at the outset a bounding box for the solid (object) is computed and for simplicity it will be assumed that the solid boundary (boundary data) is contained wholly in the interior of the bounding box (page 3, § The algorithm; Fig. 3). It is noted said system is considered to perform the method.

Kela teaches that the basic strategy adopted in the algorithm is based on the divide and conquer paradigm. Not only is the octant recursively subdivided, but the solid is also recursively portioned within each octant. First in this discussion is an examination of the octant decomposition process that breaks an octant into eight octants. The decomposition is achieved by bisecting pO (parent octant) with three mutually perpendicular planes parallel to the parent octant faces passing through the centroid of pO (pages 2-3, § Algorithm overview and notation; Figs 2-3). Each of the two linear bisectors (oflB) of the six faces of the parent octant are interested individually with $pofF_i$. The segments of the bisectors are then classified with respect to the solid. This is achieved by an orderly traversal of oflB and by computing normals at the intersection points (page 4; Figs. 2, 4-5).

Kela fails to explicitly teach storing the values of various physical properties for each of the cells. Shu et al. al teaches that the present invention relates generally to 3D volume visualization and particularly to a new data structure and method and system

which significantly reduces computational time and space in displaying surface structure of a three dimensional object (column 1, lines 7-11). Volume data is partitioned into NxNxN identical cubes called cells having 6 faces and 8 voxels or vertices, wherein each voxel is associated with at least one physical characteristic, e.g. density, of the 3D object (column 1, lines 25-29; column 17, lines 52-58). Values associated with the physical characteristics of a 3D object other than density can also be used to define the volume data set (column 6, lines 8-13).

It would have been obvious to one skilled in the art, at the time of the applicant's invention, to incorporate the association of at least one physical characteristic, for a given 3D object, with voxels or vertices representative of the volume data of a given 3D object, as taught by Shu et al., into the system taught by Kela, because such an incorporation would allow for additional data representing various physical characteristics of said 3D object to be stored within said octants and as a result would provide further detail as to the characteristics of said 3D object, while utilizing already existing vertices, as taught by Kela, for the storage of said characteristics.

6. In regards to claim 2 Kela teaches three types of octants: octant that are wholly in the interior of the solid (internal cells located in the interior of the object), octants that are wholly outside the solid (internal cells located in the outside of the region of the object) and octants that intersect the boundary of the solid (boundary cells including a boundary surface of the object) and are in general partially inside the solid (page 1; Fig. 1).

7. In regards to claim 3 it is noted that the applicant discloses that each boundary cell can be strictly or approximately replaced by cut points (page 13, lines 5-9) and thus, boundary cells and cut points are considered functionally equivalent. The rationale disclosed in the rejection of claim 2 is incorporated herein.

8. In regards to claim 4 the rationale disclosed in the rejection of claim 1 is incorporated herein (Shu et al. – column 1, lines 25-29; column 17, lines 52-58; column 6, lines 8-13). Kela teaches of octants that intersect the boundary of the solid are neither inside nor outside the solid (page 1; Fig. 1). It is noted said octants that intersect the boundary of the solid and are neither inside nor outside the solid are considered to represent two values as said octants are partially inside (first value) and partially outside (second value) the solid.

9. In regards to claim 7 the rationale disclosed in the rejection of claim 1 is incorporated herein.

10. In regards to claim 8 the rationale disclosed in the rejection of claim 2 is incorporated herein.

11. In regards to claim 9 the rationale disclosed in the rejection of claim 3 is incorporated herein.

12. In regards to claim 10 the rationale disclosed in the rejection of claim 4 is incorporated herein.

13. In regards to claim 13 said claim consists of open-ended language and as such does not explicitly exclude the use of internal cells located in the region outside of the object. The rationale disclosed in the rejection of claim 8 is incorporated herein. Kela

teaches a first subdivision, in which a given 3D object is subdivided into (first cells) eight octants (page 3, Fig. 3). It is noted said eight octants are considered octants that intersect the boundary of the solid and are in general partially inside the solid (boundary cells). At each stage the solid boundary contained in each NIO octant (boundary cell) is recursively decomposed into the eight successors. NIO octants are then recursively subdivided until a desired level of accuracy is achieved (page 3, § The algorithm). It is noted said recursive subdivision is considered to yield second and third cells (see Fig. 1).

14. In regards to claim 14 the rationale disclosed in the rejection of claim 13 is incorporated herein.

15. In regards to claim 15 the rationale disclosed in the rejection of claim 4 is incorporated herein.

16. In regards to claim 18 the rationale disclosed in the rejection of claim 3 is incorporated herein.

17. In regards to claim 19 the rationale disclosed in the rejection of claim 18 is incorporated herein. It is noted the vertices, of a given boundary octant, which are shared by another given boundary octant are considered corner points (Fig. 3).

18. Claims 5, 11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kela (Hierarchical octree approximations for boundary representation-based geometric models) and Shu et al. (U.S. Patent No. 6, 075, 538), as applied to claims 1-4, 7-10, 13-15 and 18-19, in view of Shute (Overview of C Programming).

19. In regards to claim 5 Kela and Shu et al. fail to explicitly teach that said physical property values consist of constant values which do not change by simulation, and variables which change as a result of simulation. Shute teaches a variable is a named or unnamed place for storing mutable (able to be changed) data, while a constant is a named or unnamed non-mutable (not able to be changed) program value (page 1, § The C Programming Paradigm).

It would have been obvious to one skilled in the art, at the time of the applicant's invention, to incorporate the teaching of Shute into the system taught by Kela and Shu et al., because conventional programming languages, such as C, utilize both variables and constants as the form of storing data and thus through such an incorporation would provide a conventional means by which to store said data as well as a conventional access means to said stored data.

20. In regards to claim 11 the rationale disclosed in the rejection of claim 5 is incorporated herein.

21. In regards to claim 16 the rationale disclosed in the rejection of claim 5 is incorporated herein.

22. Claims 6, 12 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kela (Hierarchical octree approximations for boundary representation-based geometric models) and Shu et al. (U.S. Patent No. 6, 075, 538), as applied to claims 1-4, 7-10, 13-15 and 18-19, in combination with Dundorf (U.S. Patent No. 5, 197, 013).

23. In regards to claim 6 Kela and Shu et al. fail to explicitly teach external data is curved surface data for a 3D CAD or CG tool. Dundorf teaches a method of producing

carved signs, wherein the method uses an integration of computer-aided design (CAD), computer-aided machining (CAM) and computerized numerical control (CNC) technology (column 3, lines 41-47). It is an even further object of the present invention to provide a CAD/CAM system for producing carved signs embodying signage works having three-dimensional incised and/or relieved curved surfaces (column 4, lines 9-12). Dundorf also teaches that octree data structures, operations and algorithms can be used with the CPCS (computer-produced carved sign) design and manufacturing system hereof (column 17, lines 35-37). It is noted that for a CAD/CAM system to produce a given carved sign embodying signage works, having 3D incised and/or relieved curved surfaces, that information pertaining to 3D incised and/or relieved curved surfaces must be entered into said CAD/CAM system prior to the production of said carved signs.

It would have been obvious to one skilled in the art, at the time of the applicant's invention, to combine the teaching of Dundorf with that of Kela and Shu et al., because Dundorf fails to go into the details of the octree division method utilized for producing carved signs, while because Kela and Shu et al. teach a system, which is considered to perform the method, for hierarchical octree approximations for boundary representation-based geometric models, wherein said system presents a novel technique to derive efficient octree approximations of B-rep solids (page 7, § Summary and Conclusion).

24. In regards to claim 12 the rationale disclosed in the rejection of claim 6 is incorporated herein.

25. In regards to claim 17 the rationale disclosed in the rejection of claim 6 is incorporated herein.

Response to Amendment

26. Applicant's amended specification, submitted on 6/14/04, has been entered.

27. In regards to applicant's remarks to the 35 USC § 112 claim rejection for claims 3-4 said rejection has been withdrawn in lieu of said remarks.

28. In regards to applicant's remark that Kela teaches a conventional Octree division method and not a modified Octree division method Kela teaches hierarchical octree approximations for boundary representation based geometric models. It is noted approximations are not considered part of conventional Octree division. Furthermore, it is noted that the features upon which applicant relies (i.e., details of modified Octree division cited on page 9, line 25, to page 25, line 14) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

29. In regards to applicant's remarks that Kela teaches classifying each octant as either "IN," "OUT" or "NIO," which is different from the presently claimed invention, it is noted the applicant discloses on page 5, ¶ 10, "...(a) internal cells 13a located in the interior of the object or in the region outside of the object, and (b) boundary cells 13b including boundary surfaces." It is clearly shown that said internal cells can represent both cells located in the interior of the object or in the region outside the object and thus read on the "IN" and "OUT" octants as taught by Kela, respectively.

30. In regards to applicant's remarks in regards to the teachings of Shu et al. and Dundorf one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

31. In regards to applicant's remarks to the examiner's unsubstantiated assertions in claim 3 it is noted that applicant discloses in the specification that each boundary cell can be strictly or approximately replaced by cut points (page 13, lines 5-9).

32. In regards to applicant's remarks to the examiner's unsubstantiated assertions in claim 5 prior art has been supplied in the place of official notice, as requested by the applicant.

Conclusion

33. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter-Anthony Pappas whose telephone number is 703-305-8984. The examiner can normally be reached on M-F 10:00am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 703-305-9798. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Peter-Anthony Pappas
Examiner
Art Unit 2671

PAP

Mark Zimmerman

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